EXCERPT – LEPIDA TV INTERVIEW TO MATTEO ROFFILLI, CEO OF BIORETICS SRL

What is Bioretics?

Bioretics is a company, a group of about ten young people who have been working for five years in advanced R&D for Artificial Intelligence applications to machines vision, where machines should be intended as machinery. (cf. *Computing Machinery and Intelligence,* https://en.wikipedia.org/wiki/Computing_Machinery_and_Intelligence)

We provide machines with a vision-based knowledge system able to interpret the world like human eyes do for supporting real-time decision making processes. We operate on project basis by injecting our patented technologies into the partner business, mainly in healthcare, biology and industry.

What are the origins of Bioretics?

We were born like ex students of Alma Mater Studiorum, Bologna University, with different competences and backgrounds. We decided to exploit our experiences for crafting a private company devoted to R&D in very multi-faced and multidisciplinary scenarios.

What are advantages and drawbacks to start after an academic experience?

The advantage is having a high study' skills validated out of Italy also by international patents and publications.

The drawbacks stems basically from the lack of a cultural basis in Italy for this kind of activities and by the absence of training in specific skills for business management. Up to now Italy lacks for a specific job contract: indeed we are included in the broad umbrella of mechanical engineering sector, area in which we enter with great difficulty obviously.

What areas of application of Machine Vision does Bioretics work in?

The applications and target sectors are almost limitless but now Bioretics applies to projects on medical diagnosis, biology and industry.

The technology, supported by the actual computing power, often shows superhuman visual skills thus opening room to attractive and amazing innovations.

Bioretics deals with providing a knowledge system based on vision and able to interpret the world like human or animal eyes to the machines and applies it in different fields, with a "featureless" approach (cf. *"A novel featureless approach to mass detection in digital mammograms based on support vector machines.",* https://www.ncbi.nlm.nih.gov/pubmed/15104319*).* In other words our approach does not rely on a predetermined set of visual primitives but let the machine alone to define them.

This methodology has been applied in X-ray digital mammography (Computer Aided Detection), in industry for Fruit&Veg selection (Grading&Sorting machine) and in optical microscopy for massive screening programs (Digital Pathology).

Now we are collaborating with L.E.N.S. - European Laboratory for Non-Linear Spectroscopy, Florence (http://www.lens.unifi.it), on data gathered by the Human Brain Project (https://www.humanbrainproject.eu/en/) to analyze and to unveil the internal structure of human and murine brain by very advanced real time techniques.

Our Machine Vision systems are based on Machine&Deep Learning techniques coupled to classical Computer Vision algorithms.

Basically we built machines that train second-order machines to solve a vision problem. In odoind so we are designing just intermediate machines. And we do that by planning and by developing algorithms that mimic human sight that the evolution has shaped to understands a continuous data stream of information.

What technical level are we in and which are the stages of development of new technologies?

The ability of the machinery, in the Leonardesque sense of the word, are compatible with human skills only in some sectors. Now Artificial Neural Networks or statistical learning methods like Support Vector Machine or Relevance Vector Machine are used to try governing different fields, for example healthcare, aeronautic & aerospace, automotive, Oil&Gas and FinTech too.

The present and always growing computing power made available by NVIDIA or other international players, make all his happen.

After many years of terrific speed of growing, for a few years now, it is witnessing a theoretical flattening without relevant innovations. I believe that the next theoretical step will be long in coming and it will be related in making the machines able to decide in a somewhat sentient way.

In other words we need the machines to exhibit comprehension regarding the quality of own decision, *i.e.* meta-cognition *(cf. https://en.wikipedia.org/wiki/Theory_of_mind)* not to be confused with consciousness.

But there is still work to be done.

Which is your reference market: Italian, European, or international?

Up to now we tried to work in few but important projects, funding R&D with royalties coming from our patents.

We built a long-term partnership with our clients coming from mechanical and medical areas. They are Italian but with large export inclination.We are proud of these partnerships especially because in Italy there are few companies that are doing something like that and in fact we are expanding our business.

Paradoxically the difficult is finding people able to work with us into our projects and not finding new business.

What are the management dynamics you need to face into business' organization?

I come from pure research and I am acting as a manager for need. Bioretics is a company like a shoe factory, with the same planning, control and management needs. In consequence of that I have to spend a lot of time in these activities by taking up it from research.

Luckily, we are integrating more mature professional profiles than us, aged and professionally experienced, to deal with these needs.

What was the mistake of first five years and what did you learn?

The biggest mistake, result of a though out personal and family choice, has been to remain in Italy.

Than the second mistake: financially sustaining by ourselves without exploiting external funding available during the years and working without high debt.

We want to change for the future and we are opening a financing round for raising new capitals in order to speed-up our intriguing R&D projects. This scale-up needs an external medium and long term injections of fresh capitals since our single partners do not have enough financial resources to sustain these big projects.

Congratulations and thank you.

Thanks. Bye